

What is claimed is:

- 1 A moving image coding device that makes a compression
and coding for moving images, said image coding device
5 comprising:
- means for analyzing images, which exist in a constant
interval, to observe characteristics of each image;
- based on said observed characteristics, means for
estimating complexity degrees of said images;
- 10 means for pre-allocating code quantity to said constant
interval, and computing target code quantity with which
said allocated code quantity is assigned to each image for
all images within said constant interval based on said
estimated complexity degrees,;
- 15 a buffer which is accumulating codes that are generated
as a result of having coded said images;
- when said computed target code quantity is assigned to
each of said images, means for calculating a transition of
occupancy in said buffer of said code to regulate said
20 target code quantity so that said buffer does not give
rise to an overflow or an underflow; and
- means for making a compression and coding for said
images according to said regulated target code quantity.
- 25 2 The image coding device according to claim 1, wherein

said means for estimating complexity degrees of said images is configured so as to estimate complexity degrees of said images, based on statistics of said analyzed images.

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3 The image coding device according to claim 1, wherein said means for predicting complexity degrees of said images is configured so as to predict complexity degrees of said images, based on said complexity degrees of said images that were already analyzed.

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4 The image coding device according to claim 1, wherein, in coding said images, which were input, with a predetermined coding method, said means for observing said characteristics is configured so as to observe code quantity, which are generated in coding said images, or said generated code quantity, and a value of a quantization scale used.

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20 5 The image coding device according to claim 1, wherein said means for observing said characteristics is configured so that: in an event of making an intra-frame coding for said images that were input, a correlation is observed between neighboring pixels within a frame of said images; and

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in an event of making an inter-frame predictive coding for said images that were input, inter-frame prediction error quantity of said images that were input is observed.

- 5 6 The image coding device according to claim 1, wherein said moving image coding device includes means for reducing the size of said images that were input; and wherein, said means for observing complexity degrees is configured so that: in an event of making an intra-frame
- 10 coding for said images that were input, a correlation is observed between neighboring pixels within a frame of said images that were input; and in an event of making an inter-frame predictive coding for said images that were input, inter-frame prediction error quantity of said size
- 15 reduced images is observed.

- 7 The image coding device according to claim 1, wherein said moving image coding device includes means for reducing the size of said images that were input, and
- 20 wherein said means for observing complexity degrees is configured so that: in an event of making an intra-frame coding for said images that were input, a correlation is observed between neighboring pixels within a frame of said reduced images; and in an event of making an inter-frame
- 25 predictive coding for said images that were input, inter-

frame prediction error quantity of said images that were input is observed.

8 The image coding device according to claim 1, wherein
5 said moving image coding device includes means for reducing the size of said images that were input, and wherein said means for observing said complexity degrees is configured so that: in an event of making an intra-frame coding for said images that were input, a
10 correlation is observed between neighboring pixels within a frame of said reduced images; and in an event of making an inter-frame predictive coding for said images that were input, inter-frame prediction error quantity of said size reduced images is observed.

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9 The image coding device according to claim 1, wherein said means for predicting complexity degrees is configured so as to predict complexity degrees for each picture type.

20 10 The image coding device according to claim 1, wherein, in coding said images input by use of an image coding technique that is applied in MPEG1 or MPEG2, said constant interval fixes an interval length of a GOP, and is a multiple of N (Integer) of said interval length of said
25 GOP.

11 The image coding device according to claim 1, wherein,
in coding said images input by use of an image coding
technique that is applied in MPEG1 or MPEG2, said combined
5 interval fixes an interval length of a GOP, and is a
multiple of N (Integer) of said interval length of said
GOP.

12 A moving image coding device that makes a compression
10 and coding for moving images, said image coding device
comprising:

means for analyzing images, which exist in a first
constant interval, to observe characteristics of each
image;

15 based on said observed characteristics, means for
estimating complexity degrees of said images;

means for predicting said complexity degrees of said
images that exist in a second constant interval that
succeeds said first constant interval;

20 means for allocating code quantity to a combined
interval in which said first constant interval and said
second constant interval were combined, based on said
estimated complexity degrees and said predicted complexity
degrees, to compute target code quantity with which said
25 allocated code quantity is assigned to each image for all

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images within said combined interval;

a buffer which is accumulating codes that are generated
as a result of having coded said images;

when said computed target code quantity is assigned to
5 each of said images, means for calculating a transition of
occupancy in said buffer of said code to regulate said
target code quantity so that said buffer does not give
rise to an overflow or an underflow; and

means for making a compression and coding for said
10 images according to said regulated target code quantity.

13 The image coding device according to claim 12, wherein
said means for estimating complexity degrees of said
images is configured so as to estimate complexity degrees
15 of said images, based on statistics of said analyzed
images.

14 The image coding device according to claim 12, wherein
said means for predicting complexity degrees of said
20 images is configured so as to predict complexity degrees
of said images, based on said complexity degrees of said
images that were already analyzed.

15 The image coding device according to claim 12, wherein,
25 in coding said images, which were input, with a

predetermined coding method, said means for observing said characteristics is configured so as to observe said code quantity, which are generated in coding said images, or said generated code quantity, and a value of a
5 quantization scale used.

16 The image coding device according to claim 12, wherein said means for observing said characteristics is configured so that: in an event of making an intra-frame
10 coding for said images that were input, a correlation is observed between neighboring pixels within a frame of said images; and

in an event of making an inter-frame predictive coding for said images that were input, inter-frame prediction
15 error quantity of said images that were input is observed.

17 The image coding device according to claim 12, wherein said moving image coding device includes means for reducing the size of said images that were input; and

20 wherein, said means for observing complexity degrees is configured so that: in an event of making an intra-frame coding for said images that were input, a correlation is observed between neighboring pixels within a frame of said images that were input; and in an event of making an
25 inter-frame predictive coding for said images that were

input, inter-frame prediction error quantity of said size reduced images is observed.

18 The image coding device according to claim 12, wherein
5 said moving image coding device includes means for reducing the size of said images that were input, and

wherein said means for observing complexity degrees is configured so that: in an event of making an intra-frame coding for said images that were input, a correlation is
10 observed between neighboring pixels within a frame of said reduced images; and in an event of making an inter-frame predictive coding for said images that were input, inter-frame prediction error quantity of said images that were input is observed.

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19 The image coding device according to claim 12, wherein said moving image coding device includes means for reducing the size of said images that were input, and

wherein said means for observing said complexity degrees
20 is configured so that: in an event of making an intra-frame coding for said images that were input, a correlation is observed between neighboring pixels within a frame of said reduced images; and in an event of making an inter-frame predictive coding for said images that were
25 input, inter-frame prediction error quantity of said size

reduced images is observed.

20 The image coding device according to claim 12, wherein
said means for predicting complexity degrees is configured
5 so as to predict complexity degrees for each picture type.

21 The image coding device according to claim 12, wherein,
in coding said images input by use of an image coding
technique that is applied in MPEG1 or MPEG2, said constant
10 interval fixes an interval length of a GOP, and is a
multiple of N (Integer) of said interval length of said
GOP.

22 The image coding device according to claim 12, wherein,
15 in coding said images input by use of an image coding
technique that is applied in MPEG1 or MPEG2, said combined
interval fixes an interval length of a GOP, and is a
multiple of N (Integer) of said interval length of said
GOP.

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23 A moving image coding method of making a compression
and coding for moving images, employing a device having a
buffer for coding, said image coding method comprising
steps of:

25 analyzing images, which exist in a constant interval, to

observe characteristics of each image;

based on said observed characteristics, estimating
complexity degrees of said images;

pre-allocating code quantity to said constant interval,
5 and computing target code quantity with which said
allocated code quantity is assigned to each image for all
images within said constant interval based on said
estimated complexity degrees;

when said computed target code quantity is assigned to
10 each of said images, calculating a transition of occupancy
in said buffer of said code to regulate said target code
quantity so that said buffer does not give rise to an
overflow or an underflow; and

making a compression and coding for said images
15 according to said regulated target code quantity.

24 The image coding method according to claim 23, wherein
in said step of estimating said complexity degrees of said
images said complexity degrees of said images are
20 estimated, based on statistics of analyzed images.

25 The image coding method according to claim 23, wherein
in said step of predicting said complexity degrees of said
images said complexity degrees of said images are
25 predicted, based on said complexity degrees of said images

that were already analyzed.

26 The image coding method according to claim 23, wherein,
when said images that were input are coded with a
5 predetermined coding method, in said step of observing
said characteristics are observed said code quantity,
which are generated in coding, or said generated code
quantity, and a value of a quantization scale used.

10 27 The image coding method according to claim 23, wherein,
in said step of observing said characteristics, in an
event of making an intra-frame coding for images that were
input, a correlation is observed between neighboring
pixels within a frame of said images, and in an event of
15 making an inter-frame predictive coding for images that
were input, intra-frame prediction error quantity of said
images that were input is observed.

28 The image coding method according to claim 23, wherein
20 said moving image coding method further includes a step of
reducing the size of said images that were input, and
wherein, in said step of observing said complexity
degrees, in an event of making an intra-frame coding for
said images that were input, a correlation is observed
25 between neighboring pixels within a frame of said images

that were input, and in an event of making an inter-frame predictive coding for said images that were input, inter-frame prediction error quantity of said size reduced images is observed.

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29 The image coding method according to claim 23, wherein said moving image coding method further includes a step of reducing the size of said images that were input, and

wherein, in said step of observing said complexity
10 degrees, in an event of making an intra-frame coding for said images that were input, a correlation observed between neighboring pixels within a frame of said reduced images, and in an event of making an inter-frame predictive coding for said images that were input, inter-
15 frame prediction error quantity of said images that were input is observed.

30 The image coding method according to claim 23, wherein said moving image coding method further includes a step of
20 reducing the size of said images that were input, and

wherein, in said step of observing said complexity
degrees, in an event of making an intra-frame coding for said images that were input, a correlation is observed between neighboring pixels within a frame of said reduced
25 images, and in an event of making an inter-frame

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predictive coding for said images that were input, inter-frame prediction error quantity of said size reduced images is observed.

5 31 The image coding method according to claim 23, wherein in said step of observing said complexity degrees predict complexity degrees for each picture type.

32 The image coding method according to claim 23, wherein,
10 in coding said images input by use of an image coding technique that is applied in MPEG1 or MPEG2, said constant interval fixes an interval length of a GOP, and is a multiple of N (Integer) of said interval length of said GOP.

15 33 The image coding method according to claim 23, wherein, in coding said images input by use of an image coding technique that is applied in MPEG1 or MPEG2, said combined interval fixes an interval length of a GOP, and is a
20 multiple of N (Integer) of said interval length of said GOP.

34 A moving image coding method of making a compression and coding for moving images, employing a device having a
25 buffer for coding, said image coding method comprising

steps of:

analyzing images, which exist in a first predetermined interval, to observe characteristics of each image;

based on said observed characteristics, estimating
5 complexity degrees of said images;

predicting complexity degrees of said images that exist in a second constant interval that succeeds said first constant interval;

allocating code quantity to a combined interval in which
10 said first constant interval and said second constant interval were combined, based on said estimated complexity degrees and said predicted complexity degrees, to compute target code quantity with which said allocated code quantity is assigned to each image for all images within
15 said combined interval;

when said computed target code quantity is assigned, calculating a transition of occupancy in said buffer of said code to each of said images to regulate said target code quantity so that said buffer does not give rise to an
20 overflow or an underflow; and

making a compression and coding for said images according to said regulated target code quantity.

35 The image coding method according to claim 34, wherein
25 in said step of estimating said complexity degrees of said

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images said complexity degrees of said images are estimated, based on statistics of analyzed images.

36 The image coding method according to claim 34, wherein
5 in said step of predicting said complexity degrees of said images said complexity degrees of said images are predicted, based on said complexity degrees of said images that were already analyzed.

10 37 The image coding method according to claim 34, wherein, when said images that were input are coded with a predetermined coding method, in said step of observing said characteristics are observed said code quantity, which are generated in coding, or said generated code
15 quantity, and a value of a quantization scale used.

38 The image coding method according to claim 34, wherein, in said step of observing said characteristics, in an event of making an intra-frame coding for images that were
20 input, a correlation is observed between neighboring pixels within a frame of said images, and in an event of making an inter-frame predictive coding for images that were input, intra-frame prediction error quantity of said images that were input is observed.

39 The image coding method according to claim 34, wherein said moving image coding method further includes a step of reducing the size of said images that were input, and

wherein, in said step of observing said complexity
5 degrees, in an event of making an intra-frame coding for said images that were input, a correlation is observed between neighboring pixels within a frame of said images that were input, and in an event of making an inter-frame predictive coding for said images that were input, inter-
10 frame prediction error quantity of said size reduced images is observed.

40 The image coding method according to claim 34, wherein said moving image coding method further includes a step of
15 reducing the size of said images that were input, and

wherein, in said step of observing said complexity degrees, in an event of making an intra-frame coding for said images that were input, a correlation observed between neighboring pixels within a frame of said reduced
20 images, and in an event of making an inter-frame predictive coding for said images that were input, inter-frame prediction error quantity of said images that were input is observed.

25 41 The image coding method according to claim 34, wherein

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said moving image coding method further includes a step of reducing the size of said images that were input, and

wherein, in said step of observing said complexity degrees, in an event of making an intra-frame coding for
5 said images that were input, a correlation is observed between neighboring pixels within a frame of said reduced images, and in an event of making an inter-frame predictive coding for said images that were input, inter-frame prediction error quantity of said size reduced
10 images is observed.

42 The image coding method according to claim 34, wherein in said step of observing said complexity degrees predicts complexity degrees for each picture type.

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43 The image coding method according to claim 34, wherein, in coding said images input by use of an image coding technique that is applied in MPEG1 or MPEG2, said constant interval fixes an interval length of a GOP, and is a
20 multiple of N (Integer) of said interval length of said GOP.

44 The image coding method according to claim 34, wherein, in coding said images input by use of an image coding
25 technique that is applied in MPEG1 or MPEG2, said combined

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interval fixes an interval length of a GOP, and is a multiple of N (Integer) of said interval length of said GOP.

- 5 45 A program for causing an information processing device,
which configures a moving image coding device that makes a
compression and coding for moving images, to execute
processes of: analyzing images, which exist in a constant
interval, to observe characteristics of each image;
10 based on said observed characteristics, estimating
complexity degrees of said images;
pre-allocating code quantity to said constant interval,
and computing target code quantity with which said
allocated code quantity is assigned to each image for all
15 images within said constant interval based on said
estimated complexity degrees;
when said computed target code quantity is assigned to
each of said images, calculating a transition of occupancy
in a buffer of said code to regulate said target code
20 quantity so that said buffer does not give rise to an
overflow or an underflow; and
making a compression and coding for said images
according to said regulated target code quantity.

- 25 46 A program for causing an information processing device,

which configures a moving image coding device that makes a compression and coding for moving images, to execute processes of:

analyzing images, which exist in a first predetermined
5 interval, to observe characteristics of each image;

based on said observed characteristics, estimating
complexity degrees of said images;

predicting complexity degrees of said images that exist
in a second constant interval that succeeds said first
10 constant interval;

allocating code quantity to a combined interval in which
said first constant interval and said second constant
interval were combined, based on said estimated complexity
degrees and said predicted complexity degrees, to compute
15 target code quantity with which said allocated code
quantity is assigned to each image for all images within
said combined interval;

when said calculated target code quantity is assigned to
each of said images, calculating a transition of occupancy
20 in a buffer of said code to regulate said target code
quantity so that said buffer does not give rise to an
overflow or an underflow; and

making a compression and coding for said images
according to said regulated target code quantity.